

CLAIMS

What is claimed is:

1. A method of turbo-charger surge detection comprising:
  - measuring a rate of air flow through a turbo-charger compressor;
  - measuring a temperature of said air flow;
  - calculating a standard mass flow rate of said air flow at said rate and said temperature;
  - measuring a pressure ratio across said turbo-charger compressor;
  - calculating a surge mass flow rate at a surge line of said compressor at said pressure ratio;
  - comparing said standard mass flow rate to said surge mass flow rate; and
  - reducing an EGR flow if said standard mass flow rate is lower than said surge mass flow rate.
2. The method of turbo-charger surge detection of claim 1, comprising further:
  - adding a surge margin to said surge mass flow rate.
3. The method of turbo-charger surge detection of claim 1, comprising further:
  - reducing said pressure ratio by opening a vane of said compressor.
4. A method of turbo-charger surge detection comprising:
  - measuring a rate of air flow through a turbo-charger compressor;
  - measuring a temperature of said air flow;
  - calculating a standard mass flow rate of said air flow at said rate and said temperature;

measuring a pressure ratio across said turbo-charger compressor;  
calculating a surge mass flow rate at a surge line of said compressor at said pressure ratio;  
comparing said standard mass flow rate to said surge mass flow rate; and  
reducing said pressure ratio by opening a vane of said compressor if said standard mass flow rate is lower than said surge mass flow rate.

5. The method of turbo-charger surge detection of claim 4, comprising further:

adding a surge margin to said surge mass flow rate.

6. A system for turbo-charger surge detection comprising:

means for measuring a rate of air flow through a turbo-charger compressor;

means for measuring a temperature of said air flow;

means for calculating a standard mass flow rate of said air flow;

means for measuring a pressure ratio across said turbo-charger compressor;

means for calculating a surge mass flow rate at a surge line of said

compressor;

means for comparing said standard mass flow rate to said surge mass flow

rate; and

means for reducing an EGR flow if said standard mass flow rate is lower than said surge mass flow rate.

7. The system for turbo-charger surge detection of claim 6, comprising further:

means for adding a surge margin to said surge mass flow rate.

8. The system for turbo-charger surge detection of claim 6, comprising further:

reducing said pressure ratio by opening a vane of said compressor.

9. A system for turbo-charger surge detection comprising:

means for measuring a rate of an air flow through a turbo-charger compressor;

means for measuring a temperature of said air flow;

means for calculating a standard mass flow rate of said air flow;

means for measuring a pressure ratio across said turbo-charger compressor;

means for calculating a surge mass flow rate at a surge line of said compressor;

means for comparing said standard mass flow rate to said surge mass flow rate; and

means for reducing said pressure ratio by opening a vane of said compressor.

10. The method of turbo-charger surge detection of claim 8, comprising further:

means for adding a surge margin to said surge mass flow rate.